

Intellectual skills serving the expanding horizon of knowledge

Prof D F M Strauss
Deans's Office
Faculty of the Humanities
University of the Free State
P.O. Box 339
Bloemfontein 9300
SOUTH AFRICA
dfms@cknet.co.za¹

Intellektuele vaardighede gaan gepaard met skerpsinnigheid en 'n sensitiviteit vir logiese finesse – soms vergetstalt in logiese raaisels (soos vergestalt in die verhaal van die Protagoras se regstudent, die paradokse van Zeno en 'n staaltjie uit Don Quichote van 1605). 'n Verwysing na die informele logika word opgevolg met 'n oorsigtelike skets van die wyse waarop ons kennishorison verskrimpel indien reduksionistiese benaderings gevolg word. Die ervaringsbesef van menigvuldigheid en geheelheid wat deel uitmaak van ons alledaagse werklikheidservaring word drasties gekompliseer sodra die samehang tussen hierdie twee ervaringsgegewens verantwoord moet word. Dit word allereers gedemonstreer aan die hand van Cantor se versamelingsbegrip en daarna word die eensydigheid van die teenstelling tussen atomisme en holisme in 'n verskeidenheid vakwetenskappe aan die orde gestel. Slegs wanneer die beginsel van die uitgeslote antinomie aanvaar word kan ons die impasse van eensydige reduksionistiese sienings te bowe kom en word diew eg geopen tot 'n sinvolle verruiming van ons kennishorison.

Intellectual challenges

Many people are intrigued by puzzles and stories with an apparent logical ring to them. Consider the story of the Greek philosopher, Protagoras, who had a student that studied law with him, but upon completing his studies did not have the money to pay his tutor. He promised to pay once he has won his first case. However, since no one approached him in order to defend him, Protagoras decided to sue him. He confronted the student informing him that he will take the case to court and that he will get his money, for if he wins the case in court the student has to pay on behalf of the court decision, and if the student wins the case he has won his first court case and therefore will have to pay. The student replied by stating that he will not have to pay, for if he wins the court case it implies that the court found that he does not have to pay, and if he loses the case he has not won his first court case and therefore also does not have to pay!

Another fascinating reasoning from ancient Greece is found in the school of Parmenides where Zeno argued against *multiplicity* and *movement* by assuming an absolutely static

¹ A slightly different version of this article served as the *Keynote* presentation at the International *Physiotherapy Conference* on: "Expanding the horizon of knowledge" UP, Pretoria, Monday, October 6, 2008.

being. The well-known reasoning regarding the *flying arrow*, *Achilles and the tortoise* as well as what is known as the *dichotomy paradox* is reported by Aristotle in his *Physics* (239 b 5 ff.). The account of the paradox of the *flying arrow* seems to *allow* for movement to begin with and then “freezes” it into distinct “moments” of time – as if something moving from “moment” to “moment” has a definitive place in space. The fourth B Fragment of Zeno phrases this situation succinctly: “Whatever moves does not move in the space it occupies, nor does it move in the space it does not occupy.”²

From *Don Quichotte*, written by Miguel de Servantes (1605), we have a story concerning a man who was given the possibility of escaping from death on condition that he had to say something – if what he said is *true* he will be *hanged* and if what he says is *false* he has to be *drowned*. In order to live he therefore said: “You are going to drown me.” If he would be drowned then what he said was *true*, in which case he had to be *hanged*; and if he is *hanged*, what he said is *false*, in which case he had to be *drowned* – implying that he could neither be hanged nor be drowned!

We are quite used to speak of the many *choices* we always have to make, without realizing that actually, in each instance, we always only have *one* choice amidst many *options* to choose from.

We are equally familiar with the logical fallacy of equivocation, i.e. instances where we draw invalid conclusions based upon the fact that the term employed obtained different meanings in different parts of the argument. By using this fallacy, for example, owing to the ambiguity of the word *nothing*, one can easily “prove” that a *Volkswagen* is better than a *Mercedes*:

There is nothing better than a Mercedes;
A *Volkswagen* is better than nothing;
therefore a *Volkswagen* is better than a *Mercedes*.

Likewise, the principle of the excluded middle, stating that any statement is either true or false (see Copi, 1994:372), may become a “victim” of equivocation in the following “proof” that the moon is made out of cheese:

The moon is either made out of cheese or it is not made out of cheese,
we all know that the moon is not made out of cheese;
therefore the moon is made out of cheese.

Quite some time ago a philosopher attended a conference of the *Philosophical Society of Southern Africa* (PSSA). Someone asked him what he was working on, upon which he replied that he writes a book with the title: “You never mean what you say.” About a

² If “being at one place” means “being at rest,” and if this is “every moment” the case with the “flying arrow,” then the arrow is actually only “at rest” – i.e., it is not moving at all. Of course, modern kinematics holds that “rest” is a (relative) state of motion. But without reference to some or other system one cannot speak about the motion of a specific kinematical subject (see Stafleu, 1980:81, 83-84).

decade later he once again attended a PSSA conference and one of the philosophers who remembered his earlier remark asked about the book he was writing at the time. He replied with a smile, asking: which book?

Critical thinking

One of the popular slogans of contemporary academic institutions is found in the idea that scholars – lecturers and students – ought to be *critical*. This ideal of *critical thinking* is *uncritically* repeated in many contexts – *uncritically* because one is never informed about the *criteria* that are to be applied while engaging in “critical thinking”!

Considering critical thinking may prompt us to think of *formal logic*. However, some of the apparently most ‘innocent’ statements used in intellectual communication may conceal multiple informal fallacies. Suppose, for example, that an academic concerned about crime and the legal system in South Africa makes the following statement in a class:

“You are all too bright to reject capital punishment!”

This statement first of all appeals to the intelligence (being ‘bright’) of the students without advancing an argument in favour of or against capital punishment (informal logic calls this an argument *ad hominem*). In the second place it refers to a widely held negative attitude towards not applying capital punishment without justifying this negative attitude (*argumentum ad invidiam*). The third fallacy is seen in the attempt to persuade the students on the basis of flattery – crediting them with the quality of being ‘bright’, once again without advancing any argument pro or con capital punishment (*argumentum ad captandum*). Finally we discern in the statement a variant of an *ad populum* fallacy (directed towards a general sentiment, empathy or fear), in this case specifically directed towards the personal fear of students who may be afraid to be seen as non-intelligent by their lecturer or fellow students (*argumentum ad baculum*).

Thinking about thinking

Although we are all talking of *concepts* it is not that easy to define a concept. It appears as if most of us do not have a concept of a concept! Concept formation highlights the fact that distinctively human traits display what one may call *ontic normativity*. It means that human thinking is guided (normed) by logical principles guiding all thought activities. The most basic feature of logical thinking is found in the unique human analytical ability to identify and to distinguish. As such it provides the foundation for humor and laughing, for we not only find it illogical but sometimes also *comical* when improper identification and distinguishing occurs. Young children are sensitive to this, for laugh spontaneously when gender switching occurs (“uncle Elizabeth” and “aunt George”). More subtle instances may require a moment's reflection before equally spontaneous laughter ensues.

Consider the story of a man walking down the street with a chicken in his arms. A youngster sitting on the pavement asks: “Where are you going with that pig?” The man answers: “This is not a pig, it is a chicken” – upon which the boy says: “Yes, I know, I am talking to the chicken!”

This peculiar human ability to identify and distinguishing is geared both towards the dimension of the “how” and that of the concrete “what” of our experience. Once something has been *identified* as *this* or *that*, one can proceed by asking *how* questions, such as: *how many?*; *how big?*; *how strong?*; *how expensive?*; *how reliable?*; and so on. In other words, through thinking we are always involved in distinguishing between different kinds of entities (contemplating their *types*), and in considering the different *modes of being* (aspects) in which they *function*.

Every aspect of reality, when lifted out in order to serve as the specific angle of approach of a particular scholarly discipline – such as the physical aspect (physics), the biological aspect (biology) the historical aspect (the science of history), the legal aspect (the science of law) – at once serves as a *mode of explanation* of reality as well. Therefore, the most basic and fundamental challenge to thinking is to acknowledge the various modes of explanation for what they are without attempting to elevate anyone of them to become the sole (and all-encompassing) mode of explanation. As soon as this is done we meet the well-known *isms* found in the history of philosophy and the disciplines, such as arithmeticism, physicalism, vitalism, psychologism, logicism, historicism, and moralism.

Putting yourself in the shoes of your conversation partner

Although every scholar is entitled to subscribe to a particular view within her discipline this right does not facilitate meaningful scholarly communication between clashing orientations. Merely stating what each of us believes to be the case often terminates in the proverbial, “I say this and You say that, so what?”

When two alternative approaches *contradict* each other the logical principle of *non-contradiction* simply states that both cannot be true at the same time and within the same context.³ Yet, when a specific orientation is found to be intrinsically *contradictory* it is clear that it attempts to defend an untenable position. Therefore one of the most powerful and effective ways in which diverging and radically contradicting points of view within scholarship can interact is by means of *immanent criticism*, laying bare internal inconsistencies. Oftentimes it is accompanied by other crucial elements of meaningful scientific communication, such as factual criticism, showing that an argument begs the question (that it is circular or assumes what it wants to argue for – a *petitio principii*), and so on.

Let us illustrate the value of these ways of scholarly communication with reference to some widely known popular views.

³ Immanuel Kant, the influential Enlightenment philosopher, already had a clear understanding of this limitation: “Therefore the purely logical criterion of truth, namely, the agreement of knowledge with the general and formal laws of the understanding and reason, is no doubt a condition sine qua non, or a negative condition of all truth. But logic can go no further, and it has no test for discovering error with regard to the contents, and not the form, of a proposition” (Kant, 1787-B:84). Establishing which one is justified requires a reference to grounds (reasons) exceeding the scope of the principle of non-contradiction. It refers to the principle of sufficient ground, discovered by Leibniz.

Under the spell of modern physics we often hear references to our “space-time world” embedded in a widespread practice found in North America and Britain in terms of which it is customary to restrict the term “science” to the domain of (mathematics and) physics. What is normally not realized is that this mode of speech by and large is the outcome of a very particular *philosophical tradition*, known as *positivism*, although its roots go back to the Renaissance and the rise of the modern era. According to positivism, genuine science is based upon so-called *empirical observation*, and *experimentation*. What positivism means by *empirical observation* is that true science has to start from what could be experienced through the senses, i.e. it must proceed on the basis of *sensory perception* and *sense data*. From sense data, science is supposed to construe its concepts and derive its laws.

Exercising immanent criticism immediately prompts questions such as: Has anyone ever *perceived* time in a sensory way? If so, then it should be specified which are the senses employed in perceiving it. It is possible to sense the *colour* of time, to *smell* it, to tell how *hard* it is and to measure its *weight*!?! The mere fact that these remarks are obviously nonsensical in an *immanent critical way* demonstrates that elevating sensory perception to the all-encompassing mode of explanation runs into serious difficulties.

Multiplicity and wholeness – the complexity of an apparently simply distinction

Mathematics

From our childhood we are exposed to the two most basic and fundamental modes of experience and modes of explanation, namely *number* and *space*. When one opens the Yearbook of a country information is first of all found regarding the population (*how many* citizens are there) and the *size* of the state – thus exploring in a specific way our awareness of multiplicity and space. A combination of these two modes of explanation provides us with the basic idea of the *universe* – in Afrikaans “heelal” (the *whole* of *everything*).

The succession of number, one, another one and so on, not only gives access to various number systems (natural numbers, integers and fractions) but also underlies our most basic understanding of *infinity* because any succession of numbers can be extended indefinitely, without and end, “infinitely.” For this reason one may call this kind of infinity the *successive infinite*. Aristotle referred to it as the *potential infinite* and opposed it to the so-called *actual infinite*. What is actually meant by the latter phrase is that a given (successively infinite) succession of numbers may also be viewed as being given *at once*, as an infinite *totality* or *whole*.⁴ Simply imagine a decreasing sequence of fractions, such as 1/1, 1/2, 1/3, 1/4 ... mapped onto the corresponding points on a straight line between 0 and 1. Although the sequence of fractions are *successively infinite* the mapping onto the line provides us with a deepened perspective, for now one can envisage that *all*

⁴ Note that the uniqueness of space is expressed in being *continuously extended*. Whatever is continuously extended is infinitely divisible. The other side of the coin of infinite divisibility is given in the fact that when all the (divided) parts are taken together we have the whole or totality of them, showing that the whole-parts relation is merely synonymous with the core meaning of continuous extension.

fractions contained in the succession are given at once, as an infinite totality, because the line (and all its points) are given at once and not in succession. Implicit in this account is the appeal to the meaning of space, as determined by the spatial order of simultaneity (at once) – and as soon as the numerical meaning of succession is directed towards our awareness of wholeness (totality, at once) the spatially deepened meaning of infinity appears in what I prefer to designate as the *at once infinite*.⁵ One can therefore simply correlate *succession* and the connection between succession and wholeness (totality) with the nature and difference between the *successive infinite* and the *at once infinite*.

The remarkable fact is that anyone not willing to contemplate the possibility of the deepened meaning of infinity, given in the idea of the *at once infinite*, has to reject some of the most spectacular developments in modern mathematics, in particular the truly incredible theory of a transfinite arithmetic as it was articulated by Georg Cantor between 1874 and 1899. The basis of his theory is given in an apparently straight-forward combination of *multiplicity* and *wholeness*, for he defines a *set* as the *bringing together* (*Zusammenfassung*) of definite, properly distinct (*wohlunterschiedenen*) elements of our intuition or thought into a whole (*zu einem Ganzen*) (see Cantor 1895:481).

Bertrand Russell and Ernst Zermelo independently of each other discovered the intrinsic problematic nature of this notion of a set and its elements (see Husserl, 1979:xxii, 399 ff.). Consider a set C which has a certain kind of sets as its elements, namely those sets A that do not contain themselves as elements.⁶ We may now contemplate two options, the one supposing that C is an element of C and the other supposing that C is not an element of C , keeping in mind that the condition for any set to be an element of C is that it cannot contain itself as an element.

(i) If C is an element of C it must this condition, i.e. that it does not contain itself as an element:

If C is an element of C then C is not an element of C

(ii) If C is not an element of C then it does meet the condition for being an element of C

If C is not an element of C then C is an element of C

Therefore, C is an element of C if and only if it is not an element of C !

Thus the apparently innocent combination of multiplicity and wholeness caused havoc within the discipline of mathematics, giving rise to conflicting schools of thought within this discipline, where the intuitionist orientation opposed the axiomatic formalism that emerged in reaction to what Russell and Zermelo discovered:

⁵ During the later middle ages and early modernity (the first half of the 14th century) theologians speculated about the infinity of God and generated the appropriate accompanying terminology. Compare the expressions *infinitum successivum* and *infinitum simultaneum* (see Maier, 1964:77-79).

⁶ The set of 120 people is not a person but a set and therefore does not contain itself as an element. By contrast, the set of all imaginable thoughts can be imagined and therefore does contain itself as an element.

The intuitionists have created a whole new mathematics, including a theory of the continuum and a set theory. This mathematics employs concepts and makes distinctions not found in the classical mathematics (Kleene, 1952:52).⁷

Positivistic materialism: a self-defeating position

The *materialistic* variant of positivism holds that matter is all there is (i.e. atoms, molecules, and macro-molecules in interaction). If there is nothing beyond matter, then what about the *statement* making this claim? Is it true? If so, then there indeed is something *immaterial*, namely *truth*. In addition one may ask: what is the status of the natural laws holding for material things? They condition *being material* but they are not themselves material. Thus both with respect to the *truth-value* and the *universal validity* of natural laws the basic claim of positivistic materialism is self-defeating!

Atomism and holism

We may expand our assessment of multiplicity and wholeness to encompass all the academic disciplines by focusing on the two most dominant philosophical orientations operative in the history of the disciplines in this regard. When the numerical aspect is elevated to an exclusive (and all-encompassing) mode of explanation we meet *atomism* and when space acquires the same status we encounter *holism*.⁸ This opposition of atomism and holism is present within every single discipline (including both the natural sciences and humanities) – and in every instance both these isms distort the true meaning of what it attempts to account for.

An alternative understanding of the world, aiming at avoiding every effort to reduce what is irreducible will be inclined to affirm both the *uniqueness* and *irreducibility* of diverse aspects of reality (that may serve as modes of explanation). In other words, atomism and holism ought to be opposed by a *non-reductionist ontology*.

In general an atomistic thinker will employ the meaning of the one and the many, i.e. of a discrete multiplicity in the *quantitative sense* of the term (or analogical usages of this quantitative meaning within the context of other modes of explanation), in order to comprehend all of reality. Applied to human society, every social collectivity is simply reduced to its simplest ‘elements,’ the individuals (the *atoms of society*). All variants of

⁷ On the basis of Cantor's set theory modern axiomatic formalism believes to have arithmetized mathematics completely. I have unveiled the circularity in this pretension elsewhere (see Strauss, 2005). If the core meaning of space (continuous extension) entails the idea of wholeness and totality, the idea of an *infinite totality* (required in employing the at once infinite) presupposes the irreducibility of space. Yet, only when the at once infinite is *used* does one “succeed” in “reducing” space to number – resulting in the realization that space can be reduced to number if and only if it cannot be reduced to number! Paul Bernays, the co-worker of the foremost mathematician of the 20th century, is therefore fully justified in stating emphatically that it is the totality-character of spatial continuity that will resist a perfect arithmetization of mathematics (see Bernays, 1976:74).

⁸ Particularly within the discipline of sociology atomism is also designated as *individualism* and holism as *universalism*.

holism (universalism), on the other hand, proceed from the employment of the concept of a whole (totality) with its parts. Thus the whole-parts relation (or analogies of this relation) serves as the guiding star, dictating that reality ought to be understood in terms of wholes and their parts (sometimes referred to as systems and subsystems). Even social relations among human beings have to be captured by this schema.

Atom and molecule: limitations of the whole parts relation

The classical mechanistic world view in an *atomistic* way reduced the universe to the notion of particles in motion. Van Melsen says that, in “most forms of atomism, it is a matter of principle that any combination of atoms into a greater unity can only be an aggregate of these atoms.” By contrast, he refers to holistic tendencies within the discipline of physics: “In modern theories atomic and molecular structures are characterized as associations of many interacting entities that lose their own identity. The resulting aggregate originates from the converging contributions of all its components. Yet, it forms a new entity, which in its turn controls the behavior of its components” (Van Melsen, 1975:349).

With regard to the infinite divisibility of a spatial whole, there are important limits in the unqualified use of the spatial whole-parts relation. The interweaving which exists, for example, between the sodium and chlorine atoms which are found in table salt cannot be accounted for merely the aid of a whole-parts perspective. Every division of table salt must – that is if we still want to be working with real parts of salt – still possess the same chemical structure (NaCl). Once we have reached the last NaCl molecule the next will be to separate Na and Cl. However, the critical question now is if sodium on its own has a salt structure – and the same question applies to chlorine? Are sodium and chlorine true parts of salt? The answer is obviously **No**, because on their own neither of them has a NaCl-structure!

This simple example already uproots the unqualified way in which, especially in modern system theory, literally everything in reality is spoken of in terms of a whole and its parts (systems and subsystems). This critique employed immanent criticism and factual criticism.

The fact that the atom nucleus remains structurally unchanged in the chemical bonding, guarantees the internal sphere of operation of the atom. Because the electrons cannot be disengaged from the atom nucleus, the atoms function as a whole in the water molecule. Note that we cannot say that the atoms function in a chemical bond. The bonding does not encompass the atomic nuclei. Nonetheless the atoms (with their nuclei, electron shells and bonding electrons) are present as a whole in the water molecule which encompasses them enkaptically. The indication: enkaptically encompassed, shows that the atoms, retaining their internal nature, are externally serving the water molecule as a whole. The enkaptic interweaving of the atoms in the molecule does not make them intrinsic parts of the molecule, since this would abrogate the internal sphere of action of the atoms. The external enkaptic function of the sodium and chlorine atoms in the salt molecule indicates the functioning of the atoms in the molecule as totality via the chemical bond. This presents us with three facts:

- (i) First of all, we must distinguish the internal sphere of action of the atom.
- (ii) Secondly, we find the chemical bond which leaves the atom nucleus unchanged because it only reaches the outer electron shells, so that the atom nuclei can in no way be part of the chemical bonding.
- (iii) Thirdly, we find the enkaptic structural whole of the water molecule which enkaptically encompasses the atomic nuclei and bonds and ascribes to each its structural typical place.⁹

This theory of enkaptic interlacement therefore enables us to side-step the one-sidedness present both in atomistic and holistic theories of chemical bonding within a molecule – and it also naturally reconciles apparently contradictory experimental data, since it accounts both for the continued actual existence of atoms in molecules (the point of orientation of atomism) and for the typical unitary (or: totality) character of the molecule (the emphasis of holism) as a new totality enkaptically founded in the structural nature of atoms.

Atomism and holism in biology

Similarly, the mechanistic theories in modern biology proceed from *atomistic* assumptions – up to neo-Darwinism. According to Smith, such an atomistic view – regarding genes and what they ‘code’ – is indeed a “problematic component of the neo-Darwinian outlook” (Smith, 1992:439). Process structuralists, such as Lambert and Hughes are critical of the fact that neo-Darwinians “invariably treat organisms as loose collections of discrete parts” (Smith, 1992:439). Eventually atomism was opposed by the holistic orientation of vitalism and neo-Vitalism. The holistic biology of Smuts (1926) and Meyer-Abich (1964) explicitly operates with the whole-parts scheme in the way they have framed their basic concepts. The same applies to the organismic biology of Von Bertalanffy, for in this approach the concept of wholeness also acquired a central role, as opposed to all forms of atomistic understanding. Von Bertalanffy considers the organismic world view to be a step beyond the mathematical *more geometrico* ideal and also beyond the mechanistic world view (see Von Bertalanffy, 1968:66).

The traditional idealistic morphology in biology is also intimately attached to a holistic orientation. What is considered an “ideal” plant or an “ideal” leaf is understood in a Platonic sense as a-temporal static forms of being (see the extensive botany text book by Troll, 1973, Chapter 1). Even in respect of the assessment of what constitutes a species, the difference between an additive (atomistic) approach and a whole-parts (holistic) view, still causes divergent views. Grene points out that Ghiselin and Hull propose “that species taxa be considered, not as classes with members, but as individuals (wholes) with parts (see Grene, 1986:440 and also Sober, 1987).

Yet living entities cannot be understood merely in terms of an atomistic or holistic perspective, because the complexity of the interlacement of the “building blocks” of living entities (namely atoms, molecules and macro-molecules) requires a theory of

⁹ Enkapsis accounts for the internal sphere of operation in spite of external intertwinements.

encapsulation recognizing at least three intertwined structures, analogous to the relationship between atom and molecule.

Association psychology versus Gestalt-psychology

Within the discipline of psychology, the dilemma of atomistic and holistic theories is also discernable. The legacy of an atomistic association psychology prevailed in the 19th century during the rise of psychology as a distinct academic discipline. However, holistic theories soon entered the scene, particularly in the Gestalt-school (the Berlin school, Krüger; and the Leipzig school, Köhler and Koffka) during the first part of the 20th century. More recently, the influence of general systems theory – which operates in a holistic way with the whole-parts relation (in the shape of the idea of systems and subsystems) – also had its effect on this discipline.

Logic divided

Modern logic also did not escape the ‘fate’ of *atomism* and *holism*. Whether or not one is willing to accept the existence of an infinite totality is decisive for the scope-of-validity of the logical principle of the excluded middle (also known as the *tertium non datur*).¹⁰

Conflicting semantic theories

Within the discipline of linguistics an example from the sub-discipline of semantics illustrates the dilemma between *atomism* and *holism*. Antal considers a *word* to be the primary “sign-unit” in language. He actually dismisses the idea of multiple meaning nuances of a word by transferring them to what is *denotated* (Antal, 1963:53, 54, 58). This atomistic approach was left behind in the development of semantic field theory that has already been initiated by Trier during the first half of the 20th century. This trend asserts that the multiplicity of meaning-nuances of a word are bound together in order to form an authentic whole (*Ganzheit*). A word is a genuine *totality*, embracing its parts *fully*, while in turn it can only signify because opposing words within its environment act in a meaning-delimiting way (see Trier, 1973:1, 5 ff., 15, and also Geckeler, 1971).

Once again the theory of enkapitic interlacements mediates an alternative understanding of the semantic field of a word, because every sentence disclosing a different meaning-nuance of a word still presupposes the intrinsic semantic domain of that word. Whenever the semantic field of a word embraces more than one meaning-nuance any instantiation of that word can never at once exhaust the full scope of its meaning domain.

Sociological atomism versus sociological holism

Another example is found in the field of sociology. Initially this relatively modern discipline pursued a so-called *organicistic* paradigm, for its founder, Comte, viewed society *as an organism* in a holistic sense. Although the British sociologist, Herbert Spencer, continued this organicistic line of thought, his own orientation reverted to an atomistic (individualistic) approach:

¹⁰ In this context we can leave aside explaining an alternative explanation of the meaning of the principle of the excluded middle. Such an analysis is found in Strauss, 1991.

So far from alleging, as M. Comte does, that society is to be re-organized by philosophy; it alleges that society is to be re-organized only by the accumulated effects of habit on character. Its aim is not the increase of authoritative control over citizens, but the decrease of it. A more pronounced individualism, instead of a more pronounced nationalism, is its ideal (Spencer, 1968:22).

The remarkable situation here is that, although both thinkers advocated organicism, Spencer did it in an *atomistic* manner and Comte in a *holistic* way! Alexander casts this opposition in the following terms: rational-individualistic versus rational-collectivist (Alexander, 1987:12). For the logical positivist, Ayer, “the English state, for example ... [is] a logical construction out of individual people” (Ayer, 1967:63). Karl Popper designates his own approach as “methodological individualism”:

It rightly insists that the ‘behavior’ and ‘actions’ of collectives, such as states or social groups, must be reduced to the behavior and to the action of human individuals (Popper, 1966-II:91).

Max Weber also explicitly denounces the idea that societal collectivities could be genuine wholes or totalities. In terms of his atomistic conviction, he states:

Concepts such as ‘state’, ‘club’ ... signifies specific kinds of communal human actions ..., that could be reduced to ‘understandable’ (*verständliches*) actions, and that means that they can, without an exception, be reduced to the actions of the individual human beings (*Einzelmenschen*) concerned (Weber, 1973:439).

Modern political theories reflect the same dilemma. The initial social contract theories (Pufendorff, Thomasius, and Locke) all departed from an atomistic perspective, attempting to arrive at a hypothetical account of an ordered society, constructing human society from its atoms, namely *individuals*.

From these examples it is sufficiently clear that the various modal aspects of reality on the one hand opens up an array of *insight-deepening* modes of explanation but, on the other hand, they may equally serve a distorting closure of our intellectual horizon (if any one of them is lifted out of its proper context and inter-modal coherence).

Concluding remark

Similar to the way in which a misunderstanding of the relationship between *multiplicity* and *wholeness* gave rise to the *isms* of atomism (individualism) and holism (universalism), the relationship between *universality* and *individuality* (two terms also derived from the aspects of space and number as modes of explanation), gave rise to *isms* such as *rationalism* and *irrationalism*. The nature of both these pairs of *isms* acquires a more penetrating characterization when the distinction between constancy and dynamics is introduced in connection with the difference between *conceptual knowledge* and *concept-transcending knowledge (idea-knowledge)*. The other side of this coin is found in

the multiple attempts, throughout the history of philosophy and the special sciences, to reduce the different aspects of reality to one specific *mode of being* or mode of explanation. The inevitable result of reductionist approaches like these is found in *antinomies*.

Reformational philosophy therefore indeed opens up an expansion of our horizon of knowledge by acknowledging that the principle of the *excluded antinomy* (*principium exclusae antinomiae*) serves as the foundation of the logical principle of non-contradiction. Whereas logical contradictions concern the confusion of configurations within one modal aspect, antinomies involve confusions of different modal aspects, leading to a *clash of laws*. The given unity and diversity within reality constantly confronts every scholarly discipline with fundamental problems. Throughout the history of philosophy and the various academic disciplines (the natural and the social sciences) these problems were largely treated in a *reductionistic way*, i.e. our intellectual legacy is seriously hampered by attempts to define what is truly unique and indefinable in terms of some or other elevated principle or mode of explanation.

Yet, one can only deify or absolutize something that is out there. Consequently, scholarly communication should always start by showing a sense of solidarity before critique could be formulated. This yardstick of *critical solidarity* requires that one first has to identify what is *worthwhile* in an alternative approach – that ought to be accounted for in spite of the fact that one may differ from that approach or differ from the way in which such an approach gives account of a problem transcending its own perspective. Only then is it meaningful to proceed with *immanent* and *factual criticism* and even move on to investigate the ultimate commitments behind a specific approach.

The plea for a non-reductionistic ontology, i.e. a theoretical understanding of reality in which the unity and diversity, the uniqueness and coherence of what is given within reality will be respected, should be the guiding star on the on-going road of scholarly reflections for only such an approach will be able to do justice to the richness of creation and thus paves the way for a truly fruitful and insightful expansion of our intellectual horizons.

Literature

- Alexander, J.C. 1987. *Sociological Theory since World War II, Twenty Lectures*. New York: Columbia University Press.
- Antal, L. 1963. *Questions of Meaning*. The Hague: Mouton.
- Ayer, A.J. 1967. *Language, Truth, and Logic*. London: V. Gollancz (First published January 1936; Second edition – revised and reset – 1946).
- Bernays, P. 1976. *Abhandlungen zur Philosophie der Mathematik*. Darmstadt: Wissenschaftliche Buchgesellschaft
- Cantor, G. 1895. Beiträge zur Begründung der transfiniten Mengenlehre. In: *Mathematische Annalen*, Volume 46 (pp.481-512) and 1897 Volume 49 (pp.207-246).
- Diels, H. and Kranz, W. 1959-1960. *Die Fragmente der Vorsokratiker*. Vols. I-III. Berlin: Weidmannsche Verlagsbuchhandlung.

- Geckeler, H. 1971. *Strukturelle Semantik und Wordfeldtheorie*. München: Fink.
- Greene, M. 1986. *Perception, Interpretation, and the Sciences: Toward a New Philosophy of Science*. In: Depew, D.J. & Weber, B.H.: *Evolution at Crossroads*, 2nd Print, London.
- Husserl, E. (Edited by Bernhard Rang), 1979. *Edmund Husserl, Aufsätze und Rezensionen (1890-1910)*. Husserliana, Edmund Husserl, Gesammelte Werke, Volume XXII. The Hague: Martinus Nijhoff Publishers.
- Kant, I. 1787. *Kritik der reinen Vernunft* (1781), 1st print 1781 (references to CPR A or B).
- Kleene, S.C. 1952. *Introduction to Metamathematics*. Amsterdam: North-Holland Publishing Company.
- Maier, A. 1964. *Ausgehendes Mittelalter*. Vol.I, Rome: Edizioni di Storia e letteratura.
- Meyer-Abich, A. 1964. *The historico-philosophical background of the modern evolution-biology: nine lectures delivered during October and November of 1960 at the department of zoology of the university of Texas in Austin, Texas USA*, *Acta Biotheoretica. Supplementum* 10, Leiden: Brill.
- Popper, K. 1966. *The Open Society and its Enemies*, Vol. I & II, London: Routledge & Kegan Paul.
- Smith, K.C. 1992. Neo-Rationalism versus Neo-Darwinism: Integrating Development and Evolution. In: *Biology and Philosophy* 7, 1992 (pp.431-451).
- Smuts, J.C. 1926. *Holism and Evolution*. London: Macmillan.
- Sober, E. 1987. *The Nature of Selection; Evolutionary Theory in Philosophical Focus*. London: The MIT Press.
- Spencer, H. 1968. *Reasons for Dissenting from the Philosophy of Comte and other Essays*. Berkeley: Glendessary Press.
- Stafleu, M.D. 1980. *Time and Again, A Systematic Analysis of the Foundations of Physics*, Toronto: Wedge.
- Strauss, D.F.M. 1991. The ontological status of the principle of the excluded middle. In: *Philosophia Mathematica* II, 6(1):73-90.
- Strauss, D.F.M. 2002. Philosophical reflections on continuity. *Acta Academica*, 2002 34(3):1-32.
- Strauss, D.F.M. 2005. *Paradigmen in Mathematik, Physik und Biologie und ihre philosophische Wurzeln*. Frankfurt am Main: Peter Lang.
- Trier, J. 1973. *Aufsätze und Vorträge zur Wortfeldtheorie*. Edited by von Anthony van der Lee and Oskar Reichmann, The Hague: Mouton.
- Troll, W. 1973. *Allgemeine Botanik*, revised and extended edition, Stuttgart: Ferdinand Enke Verlag.
- Van Melsen, A.G.M. 1975. Atomism. In: *Encyclopedia Britannica*, 15th edition, London, Volume 2 (pp.346-351).
- Von Bertalanffy, L. 1968. *Organismic Psychology and Systems Theory*. Massachusetts: Clarke University Press.
- Weber, Max 1973. *Gesammelte Aufsätze zur Wissenschaftslehre*, 4th edition. Tübingen: Mohr.